

PATENT

INSTITUT FRANÇAIS DU PETROLE

**METHOD FOR FORMING AN OPTIMIZED NEURAL NETWORK MODULE  
INTENDED TO SIMULATE THE FLOW MODE OF A MULTIPHASE  
FLUID STREAM**

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ABSTRACT

- Method for forming a module (hydrodynamic or thermodynamic for example) intended for real-time simulation of the flow mode, at any point of a pipe, of a multiphase fluid stream comprising at least a liquid phase and at least a gas phase, so that it is best suited to fixed operating conditions concerning a certain number of determined structure and physical parameters relative to the pipe, and a set of determined physical quantities (hydrodynamic or thermodynamic quantities for example), with fixed variation ranges for the parameters and the physical quantities.
- It comprises using a modelling system based on non-linear neural networks having each inputs for structure parameters and physical quantities, outputs where quantities necessary for estimation of the flow mode are available, and at least one intermediate layer. The neural networks are determined iteratively to adjust to the values of a learning base with predetermined tables connecting various values obtained for the output data to the corresponding values of the input data. A learning base suited to the imposed operating conditions is used and optimized neural networks best adjusted to the imposed operating conditions are generated.
- Applications : modelling of hydrocarbon flows in pipes for example.

10024719.122101